

Claim Amendments

1. (currently amended) An apparatus, comprising:

one or more heat exchanger components that in major part are operably located outside a rack-mounted computer chassis and serve to reduce one or more temperatures of one or more heat producing components supported within the rack-mounted computer chassis;

wherein the one or more heat exchanger components are coupled with one of a front or rear surface of the rack-mounted computer chassis without in major part extending beyond vertical and horizontal dimensions of the one of the front or rear surface of the rack-mounted computer chassis;

wherein a location of the one or more heat exchanger components at the front or rear surface of the rack-mounted computer chassis serves to allow a user to move the rack-mounted computer chassis in and out of a rack without uncoupling the one or more heat exchanger components from the rack-mounted computer chassis.

2. (original) The apparatus of claim 1, wherein the one or more heat exchanger components comprise a heat exchanger component, wherein the heat exchanger component comprises one or more portions of tubing;

wherein the heat exchanger component passes a fluid through the one or more portions of tubing to reduce one or more of the one or more temperatures of the one or more heat producing components.

3. (original) The apparatus of claim 2, wherein the heat exchanger component comprises one or more fins, wherein the fluid transfers heat to the one or more fins as the fluid passes through one or more of the one or more portions of tubing against the one or more fins;

wherein the one or more fins promote a reduction in the one or more of the one or more temperatures of the one or more heat producing components.

4. (original) The apparatus of claim 3, wherein the one or more portions of tubing comprise one or more heat transfer sections, wherein the one or more heat transfer sections comprise a first heat transfer section that abuts the one or more heat producing components;

wherein the heat exchanger component moves the fluid through the first heat transfer section to promote a transfer of heat from the one or more heat producing components, wherein the transfer of heat from the one or more heat producing components serves to reduce the one or more of the one or more temperatures of the one or more heat producing components;

wherein the one or more heat transfer sections comprise a second heat transfer section that abuts the one or more fins, wherein the heat exchanger component moves the fluid against one or more of the one or more fins to transfer heat from the fluid to the one or more of the one or more fins.

5. (original) The apparatus of claim 3, wherein the heat exchanger component dissipates heat through the one or more fins to reduce the one or more of the one or more temperatures of the one or more heat producing components.

6. (previously presented) The apparatus of claim 5, wherein the heat exchanger component employs a natural convection outside of the rack-mounted computer chassis to dissipate the heat, wherein one or more of the one or more fins are located outside of the rack-mounted computer chassis, wherein the natural convection flows against the one or more of the one or more fins to dissipate the heat.

7. (previously presented) The apparatus of claim 5, wherein the heat exchanger component employs one or more fans located outside of the rack-mounted computer chassis to dissipate the heat, wherein one or more of the one or more fins are operably located outside of the rack-mounted computer chassis, wherein the one or more fans force air against the one or more of the one or more fins to dissipate the heat.

8. (previously presented) The apparatus of claim 5, wherein the heat exchanger component employs one or more fans located inside of the rack-mounted computer chassis to dissipate the heat, wherein one or more of the one or more fins are operably located outside of the rack-mounted computer chassis, wherein the one or more fans force air against the one or more fins to dissipate the heat.

9. (original) The apparatus of claim 2, wherein the heat exchanger component comprises one or more pump components, wherein the one or more pump components move the fluid through the one or more portions of tubing.

10. (original) The apparatus of claim 2, wherein one or more cold plates abut one or more of the one or more heat producing components;

wherein one or more of the one or more portions of tubing pass through the one or more cold plates;

wherein the heat exchanger component passes the fluid through the one or more of the one or more portions of tubing to transfer heat from the one or more cold plates to the fluid;

wherein the cold plates transfer the heat from the one or more cold plates to the fluid to reduce the one or more of the one or more temperatures of the one or more heat producing components.

11. (original) The apparatus of claim 2, wherein the fluid comprises a mixture of water and a coolant, wherein the heat exchanger component employs the mixture of water and the coolant to reduce the one or more of the one or more temperatures of the one or more heat producing components.

12. (previously presented) The apparatus of claim 1 in combination with the rack-mounted computer chassis, wherein the one or more heat exchanger components are coupled to an outer surface of the rack-mounted computer chassis.

13. (currently amended) The apparatus of claim 12, wherein the one or more heat exchanger components comprise a heat exchanger component, wherein the outer surface comprises a rear outer surface, wherein the heat exchanger component comprises a size that is less than or equal to a size of the rear outer surface of the rack-mounted computer chassis;

wherein the rack-mounted computer chassis sits in ~~a~~ the rack, wherein the size of the heat exchanger component allows removal of the rack-mounted computer chassis and the heat exchanger component from the rack.

14. (previously presented) The apparatus of claim 12, wherein the one or more heat exchanger components comprise a heat exchanger component, wherein the heat exchanger component is operably located at a location outside of the rack-mounted computer chassis;

wherein the location promotes an ease of accessibility to the heat exchanger component, wherein the ease of accessibility promotes an ease of serviceability of the heat exchanger component.

15. (previously presented) The apparatus of claim 12, wherein the one or more heat exchanger components comprise a heat exchanger component, wherein the heat exchanger component is in major part operably located at a location outside of the rack-mounted computer chassis;

wherein a placement of the heat exchanger component at the location in major part outside of the rack-mounted computer chassis rather than in major part inside the rack-mounted computer chassis, promotes an increase in available space inside the rack-mounted computer chassis, wherein the available space allows for a placement of one or more additional computer components within the rack-mounted computer chassis.

16. (previously presented) The apparatus of claim 1, wherein the one or more heat producing components comprise one or more processors located within the rack-mounted computer chassis, wherein the one or more heat exchanger components serve to reduce one or more of the one or more temperatures of the one or more processors.

17. (previously presented) The apparatus of claim 1, wherein the one or more heat producing components comprise one or more circuit boards located within the rack-mounted computer chassis, wherein the one or more heat exchanger components serve to reduce one or more of the one or more temperatures of the one or more circuit boards.

18. (currently amended) An apparatus, comprising:

means for passing a fluid against one or more heat producing components located inside a rack-mounted computer chassis to promote a reduction of one or more temperatures of the one or more heat producing components; and

means for operably locating in major part outside of a-the rack-mounted computer chassis, the means for passing the fluid against the one or more heat producing components;

wherein the means for passing the fluid is coupled with one of a front or rear surface of the rack-mounted computer chassis without in major part extending beyond vertical and horizontal dimensions of the one of the front or rear surface of the rack-mounted computer chassis;

wherein a location of the means for passing the fluid at the front or rear surface of the rack-mounted computer chassis serves to allow a user to move the rack-mounted computer chassis in and out of a rack without uncoupling the means for passing the fluid from the rack-mounted computer chassis.

19. (original) The apparatus of claim 18, wherein the means for passing the fluid against the one or more heat producing components to promote the reduction of the one or more temperatures of the one or more heat producing components comprise means for moving the fluid through one or more portions of tubing, wherein one or more of the one or more portions of tubing abut the one or more heat producing components.

20. (previously presented) The apparatus of claim 19, wherein the means for moving the fluid through the one or more portions of tubing comprise means for moving the fluid between the one or more heat producing components and one or more fins located outside of the rack-mounted computer chassis, wherein one or more of the one or more portions of tubing abut the one or more fins.

21. (original) The apparatus of claim 19, wherein the means for moving the fluid through the one or more portions of tubing comprise means for transferring heat from the one or more heat producing components to the fluid to reduce the one or more temperatures of the one or more heat producing components.

22. (previously presented) The apparatus of claim 21, wherein the means for transferring the heat from the one or more heat producing components to the fluid to reduce the one or more temperatures of the one or more heat producing components comprise means for transferring the heat from the fluid to one or more fins located outside of the rack-mounted computer chassis.

23. (previously presented) The apparatus of claim 22, wherein the means for transferring the heat from the fluid to the one or more fins located outside of the rack-mounted computer chassis comprise means for forcing air against the one or more fins to promote a reduction of one or more temperatures of the one or more fins.

24. (currently amended) The apparatus of claim 18, wherein the rack-mounted computer chassis sits in ~~a~~the rack, wherein the means for operably locating in major part outside of the rack-mounted computer chassis, the means for passing the fluid against one or more heat producing components comprise means for increasing accessibility of the rack-mounted computer chassis in the rack to promote an ease of serviceability of the rack-mounted computer chassis.

25. (currently amended) A method, comprising the steps of:

employing one or more heat exchanger components to reduce one or more temperatures of one or more heat producing components located inside a rack-mounted computer chassis; and

operably-locating the one or more heat exchanger components in major part outside of a the rack-mounted computer chassis;

coupling the one or more heat exchanger components with one of a front or rear surface of the rack-mounted computer chassis without the one or more heat exchanger components in major part extending beyond vertical and horizontal dimensions of the one of the front or rear surface of the rack-mounted computer chassis; and

locating the one or more heat exchanger components at the front or rear surface of the rack-mounted computer chassis to allow a user to move the rack-mounted computer chassis in and out of a rack without uncoupling the one or more heat exchanger components from the rack-mounted computer chassis.

26. (currently amended) The method of claim 25, wherein the one or more heat exchanger components comprise a heat exchanger component, wherein the heat exchanger component comprises one or more portions of tubing, wherein the step of employing the heat exchanger component to reduce the one or more temperatures of the one or more heat producing components located inside the rack-mounted computer chassis comprises the steps of:

pumping a mixture of water and a coolant through the one or more portions of tubing to the one or more heat producing components;

transferring heat from one or more of the one or more heat producing components with the mixture; and

pumping the mixture through the one or more portions of tubing from the one or more of the one or more heat producing components to the heat exchanger component.

27. (original) The method of claim 26, further comprising the steps of:

transferring heat from the mixture to the one or more fins;

forcing air against one or more of the one or more fins; and

dissipating heat at the one or more of the one or more fins to reduce the one or more temperatures of the one or more of the one or more heat producing components.

28. (original) The method of claim 26, wherein one or more of the one or more heat producing components abut one or more cold plates, wherein the step transferring heat from the one or more of the one or more heat producing components to the mixture comprises the steps of:

transferring heat from the one or more of the one or more heat producing components to the one or more cold plates;

moving the mixture through the one or more cold plates in the one or more portions of tubing; and

transferring the heat from the one or more cold plates for a reduction of the one or more temperatures of the one or more of the one or more heat producing components.

29. (canceled)

30. (currently amended) The apparatus of ~~claim 29~~ claim 1, ~~further comprising a in combination with the rack, to support wherein the rack supports~~ the rack-mounted computer chassis, wherein the heat exchanger component is accessible from an opening in a front or rear of the rack.

31. (canceled)

32. (currently amended) The apparatus of ~~claim 29~~ claim 1, further comprising one or more fans to force a stream of air over the one or more heat producing components and through the heat exchanger component coupled with the front or rear surface of the rack-mounted computer ~~server~~ chassis.